

Upper Mississippi River Nine-Foot Channel Project,
Lock and Dam Number 8
Genoa, Wisconsin, Vicinity
Vernon County, Wisconsin
Houston County, Minnesota

HAER No. WI-49

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WIS,
62-GEN.V,
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Rocky Mountain Regional Office
National Park Service
U.S. Department of the Interior
P.O. Box 25287
Denver, Colorado 80225

HISTORIC AMERICAN ENGINEERING RECORD

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Location: Lock and Dam Number 8 is located 679.2 miles above Cairo, Illinois, and 173.4 miles downstream from Minneapolis, Minnesota. During the construction of the complex, the river was approximately 1,200 feet wide at normal stage, increasing to 13,000 feet at periods of high water. The terrain consisted of sand flats with brush and willows. Timber was located on higher ground. Bluffs rose quickly on the left bank of the river.

Builder: U.S. Army Corps of Engineers

Present Owner: U.S. Army Corps of Engineers
St. Paul District
U.S. Government

Present Use: River navigation/hydrologycontrol

Significance: The Upper Mississippi Lock and Dam Project represents one of the largest and most ambitious of such undertakings. With roots in the Progressive Era, the project was adopted by New Deal proponents to serve the needs of public employment during the Great Depression. Its successful completion turned the upper reaches of one of the world's largest rivers into an intra-continental canal and settled the question of a fully navigable interior river system through the Midwest. Completion of the system helped allay economic inequities in commercial rail and water freight rates brought about as a result of the opening of the Panama Canal. Although significantly altering the environment of the upper Mississippi, the project also served as an impetus for the upgrading of municipal drinking water and sewage disposal systems, as well as providing new recreational opportunities, thus, in the end, proving generally beneficial to public welfare.

Historian: William Patrick O'Brien, October 1987

(See HAER No. MN-20, Upper Mississippi River Nine-Foot Channel Project History, Locks and Dams 3 - 10)

PART I. HISTORICAL INFORMATION

A. Physical History:

1. Dates of Erection: 1933-1938
2. Architect/Engineer: U.S. Army Corps of Engineers
3. Original and Subsequent Owners: U.S. Government
4. Builders, Contractors, Suppliers:
 - a. General contractors--lock construction: Jutton-Kelly Company, Milwaukee, Wisconsin
 - b. Subcontractors--lock construction: R. G. Hase, Spring Green, Wisconsin (test pile driving); Ferd J. Robers, Burlington, Wisconsin (upper guide wall foundation dredging); E. E. Gillen Co., Milwaukee, Wisconsin (timber foundation pile driving); L. P. Friedstadt Co., Chicago, Illinois (reinforcing placement); R. C. Mahon Co., Detroit, Michigan (fabrication and erection of structural steel and machinery); Commonwealth Electric Co., Minneapolis, Minnesota (conduit and electrical work); Nuemann Dredging Co., Oshkosh, Wisconsin (sandfill behind land wall)
 - c. General contractors--dam construction: Siems-Helmers, Inc., St. Paul, Minnesota
 - d. Subcontractors--dam construction: Treadwell Construction Co.; Oscar Daniels Co. (erection of steel); H. Knudson Co. (steel painting); Commonwealth Electric Co. (electrical work); LaCrosse Dredging Co. (dredging); Fugina, Miller and Dresser Co. (stone and clay); T. C. Esser Co. (glazing); John Ledegar Co. (roofing); Ferd J. Robers Co. (dike embankment) [locations unavailable]
5. Original Plans And Construction: U.S. Army Corps of Engineers

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6. Alterations and Additions:

<u>Item</u>	<u>Year</u>
Replace side seal on left side of lower Tainter valve in landwall with rubber seal	1938
Repaint Roller gates and service bridge	1938
Construct rock and brush mattress for river scour protection on downstream side of dam	1940
Repaint Roller gates, Tainter gates, service bridge, and Roller gate emergency bulkheads	1945
Repair damaged landwall of the lock, result of shifting of the upper guide wall	1951
Install scour protection above and below Roller gate section of the dam adjacent to lock wall and below center portion of Tainter gate section and downstream bank of storage yard	1951
Install rock scour protection at lower end of lower guide wall	1952
Recondition upper and lower main lock Miter gates (lock was dewatered)	1952
Install automatic railroad grade crossing signals	1954
Construct low water bypass through earth dike	1956
Install cathodic protection system on auxiliary lock gates	1956
Repaint auxiliary lock Miter gates above the water surface	1956
Install traveling mooring bits	1961
Repair access roads	1961
Bank erosion repair	1962
Repaint Roller and Tainter gates	1964
Reroof central control station	1967
Replace sector and bevel gear bushings, etc.	1968
Gravel replacement on dike (1969 flood)	1969
Construct second low water bypass through submersible earth dike	1970
Comfort stations constructed	1970
Sewer and water modifications construction	1979
Riprap scour water construction at lock	1981
Install new crane on dam	1981
Replace pierhouse 1 roof	1983
Scour repair--dam	1983-84
Construct loading dock	1984

B. Historical Context

Lock and Dam Number 8 were a group "B" project priority and the sixth scheduled for completion in the channelization project. Designs for the complex were not dictated by unusual river hydrology so much as for the need for a lock and dam system at that point of the river, so that the Nine-Foot Channel system might function properly.

Lock dimensions are the standard 110 by 600 feet, with a planned auxiliary lock with dimensions of 110 by 360 feet.

The movable dam system consists of Roller and Tainter gates with five 3-foot submersible Roller gates, 80 by 20 feet, and eight non-submersible and two 2-foot submersible Tainter gates, 35 by 15 feet. The submersible units are at both ends of the movable dam section. The dam is 934.5 feet long.

Two submersible dams, with lengths of 937.5 and 1,337.5 feet, and an earth-filled dike, with a total length of 15,720 feet, are included in the complex. The dams replaced earlier specifications for 1,200- and 800-foot reinforced concrete spillway sections. Lockkeeper's and assistant lockkeeper's dwellings, esplanade work, and a garage/pumphouse completed the original configuration.

Foundation materials consist of piles in sand, gravel, and broken clay for the lock system and piles in sand and gravel for the movable dam element.

Lock lift is 11 feet. Upper normal pool elevation is 631 feet. Depth on upper Miter sill is 22 feet; lower Miter sill is 14 feet.

Eighty-six accidents and one fatality resulted during the dam construction; no accidents or fatalities were reported during construction of the lock.

The lock element was completed on March 4, 1935; dam systems were completed on April 30, 1937. The complex took four years to complete (1934-1938) at an estimated cost of \$7,728,000. The complex was opened to navigation in 1937. Supervision of the lock construction and design and supervision of the movable dam system was accomplished by the St. Paul District Office under the direction of Maj. Dwight Johns.

PART II. TECHNOLOGICAL

A. General Statement:

1. Architectural character: standardized Ohio-Mississippi lock design.
Drawing numbers: 8-20-(A), 1

B. Description of General Layout and Principal Elements:

1. Overall dimensions: 110 by 600 feet. Drawing number: 8-20-1
2. Foundations: wood and steel sheet pilings in sand, gravel, and broken rock
3. Walls: reinforced monolithic concrete
4. Structural system: see above
5. Bulkheads: concrete bulkhead configurations occur at each end of the riverward lockwall
6. Upper and lower guide walls: monolithic reinforced concrete walls extending out from the lock chamber at both ends to assist in the guiding of barge traffic into the lock
Drawing number: 8-20-1
7. Stage recorder: small concrete housing located at the end of the lock guide wall.
Equipment housed for the recording of river stages. Drawing number: 8-77-4

C. Mechanical Equipment

1. Operating house: controls for lock gates and Tainter valves housed in small buildings on lockwall. Drawing number: 8-41-1
2. Tainter valves: cable drive lock valve of steel construction with electric motorized assembly.
3. Gates: two Miter gates balanced on stainless steel pintels operated by gear arm system and electric motor assemblies. Bumper lines on interior of lock, also of stainless steel. All other associated metal parts are of steel, stainless steel, or steel/nickel alloy.
Drawing numbers: 8-21-1, 17; 8-22-1
4. Lighting: various freestanding single and double head lighting standards, ca. 1935.

5. Plumbing: lock is watered by four cable drive Tainter valves serving a system of cast-in-place tunnels that enable the water level to be controlled on the interior of the lock. Drawing numbers: 8-20-A,8-21-28
6. Winch: motorized assembly to assist towing of barges through lockage.

D. Other Elements:

1. Auxiliary lock: fixed Miter gate without machinery and partial walls locate to the riverward side of the lock complex. Equipped with wells for machinery placement. It was never completed or put into service.
2. Tide gauge: tide measuring device inset into main lock wall. Drawing number: 8-20-24

PART III. TECHNOLOGICAL INFORMATION - MOVABLE DAM

A. General Statement:

1. Architectural character: type 2a Roller gate piers have large beveled corners and are elephantine in nature. Drawing number: 8-40-1
2. Condition of fabric: excellent

B. Description of Exterior:

1. Overall dimensions: 934.5 feet in length. Drawing number: 8-40-1
2. Foundations: wood and steel sheet pilings in sand and gravel. Drawing numbers: 8-40-4,6
3. Operating house walls: monolithic reinforced concrete. Drawing numbers: 8-41-(1),2
4. Structural system: monolithic concrete/structural steel. Drawing number: 8-40-2
5. Bulkheads: concrete bulkheads located at the base of each Roller gate pier
6. Operating house openings: two doorways and 13 three-pane slit windows for each Roller gate operating house. Drawing number: 8-40-1
 - a. Doorways and doors: 12

b. Windows: 78

7. Operating house roofs:

a. Shape, covering: flat roof covered in membrane/tar composition

b. Towers, piers: five Roller gate piers and operating house towers; one access tower. Drawing numbers: 8-40-B,1, 3; 8-41-(1),2

8. Access bridges:

a. Shape: arched spans in a segmental series

b. Materials: structural steel. Drawing number: (8-53-11)

C. Description of General Layout and Principal Elements:

1. Access plans: plan of access consists of a simple stairway to the initial pier operating house, each installation being connected by an access bridge/railtrack in a linear series. Drawing number: 8-40-1

2. Stairways: reinforced concrete with pipe railing

3. Flooring: reinforced concrete

4. Wall and ceiling finish: reinforced concrete

5. Hardware: brass

D. Mechanical Equipment:

1. Movable gates--Roller type: five 3-foot submersible Roller gates, 80 by 20 feet, operating on tooth track and independent chain-driven hoist machinery. Drawing numbers: 8-40-A; 8-47-1,2, 16, 17; 8-48-C,(D) 1, 2, 6

2. Movable gates--Taintertype: two 2-foot submersible and nine non-submersible Tainter gates have independent chain-driven hoist machinery. Drawing numbers: 8-54-1,2; (8-55-1,2)

3. Lighting: fixtures as of time of installation ca. 1935. Rewiring may have taken place over the years--extent is unknown.

E. Other Elements:

1. Earth dikes: a linear non-submersible dike with riprap revetment runs north/northwest/west of the movable dam section along the riverbank on the Minnesota side. The earth dike is interrupted by two submersible dams, one 1,337.5 feet in length, the other 937.5 feet in length. Drawing numbers: 8-52-2,3
2. Spillways: 1,200- and 800-foot spillway sections of reinforced concrete, originally specified for the complex, were replaced before construction by submersible dam elements.
3. Gate bulkheads: temporary blocking units of structural steel girder construction placed in gate openings in period of emergency or repair. Drawing number: 8-58-1
4. Bulkhead car/tracks: car designed to store and access bulkheads. Located in storage yard.
5. Flatcar assembly: car for the transport of gate bulkheads and repair materials.
6. Movable crane: vertical lift crane (replaced c. 1980) used for the moving of parts and equipment. Operates on track system attached to girder spans. Original "B" type unit. Drawings of replacement unit available from St. Paul District Office. Drawing number: 8-57-1
7. Storage yard: area surrounding the last Tainter gate pier on the Minnesota side. Contains replacement parts for gates, bulkheads on track cars, and related repair items.
8. Boat launch: single-armed launch of metal construction. Installed ca. 1985.

PART IV. TECHNOLOGICAL INFORMATION--ESPLANADE AREA

A. Description of Esplanade--General Layout:

1. Design character: standardized park/service area component. The esplanade area was originally designed to accommodate the central control station, lockkeeper's and assistant lockkeeper's residences, parking, and other service-related functions. Drawing numbers: 8-38-(7),8
2. Historic landscape design: based on standardized designs. See drawings for esplanade and lockkeepers' residences. Drawing numbers: 8-38-13,15

B. Condition of Site and Structures: Altered

1. Central control station--exterior: standardized construction. Hip roof; concrete stucco finish. Drawing numbers: 8-70-1, 2, 5, (6)
 - a. First floor contains central control panel and room, bathroom, main office, and basement stairway access. Drawing numbers: 8-70-2; 8-71-1
 - b. Basement contains storage and equipment rooms. All interior finishes altered from original construction. Drawing number: 8-70-2
2. Lockkeeper's/assistant lockkeeper's residences--standardized Colonial Revival with side porch. The structures have been moved off site to locations presently unknown.
3. Outbuildings: various sheds and service buildings have been erected from time to time, as demands required--none have particular significance or contribute to the site.

C. Other Elements:

1. Pedestrian underpass: a reinforced concrete pedestrian underpass gives access to the movable dam section, passing under an active railway line between the railroad right-of-way and the esplanade area. The element is standardized.

PART V. SOURCES OF INFORMATION

- A. Original Architectural Drawings: St. Paul District Office, Construction Drawings--9-Foot Channel Project 1927-1984. Passim.
- B. Early Views: Construction Photographs: Lock and Dam 8--Photograph Log Books
- C. Interviews: Personnel, Lock and Dam 8
- D. Bibliography:
 1. Primary and unpublished sources: National Archives, Record Group 77; Construction Histories--Lock and Dam 8; see bibliography
 2. Secondary and published sources: see bibliography
- E. Likely Sources Not Yet Investigated: National Archives, Record Group 77, Suitland, Maryland; St. Louis, Missouri
- F. Supplemental Material: Aerial Photographs, U.S. Army Corps of Engineers, St. Paul District

INDIVIDUAL SIGNIFICANCE AND INVENTORIES
LOCKS AND DAMS 3 THROUGH 10

This series of documentation outline specific significant technologies reflected in the construction of the individual lock and dam complexes, calling attention to unique engineering design items. Changes made to various systems since their initial completion are also a part of this section. A number of maintenance changes have occurred at various times since their completion. Changes made before 1970 are not well documented; many were superficial. Complete documentation to system changes is contained in the monthly condition reports filed with the St. Paul District Office by the various installations. Some changes may have been made over the years without benefit of documentation. Therefore, the tables included in this report should not be interpreted as entirely inclusive.

It should be noted that architectural and engineering components vary significant from site to site. Architectural styles for gate pier design fall into two categories: those completed prior to 1935-1936 (1a, 1b) and those completed after those dates (2a, 2b). Only one 1a structure exists in the entire Nine-Foot Channel system and is located at Rock Island, Illinois. As such, it is not a part of this study. The 1b structures are characterized by large, multipane windows, hip roofs, and engaged buttress detailing on the gate house piers. The 2a structures are more streamlined in style, with slit, three-pane windows, flat roofs, and no buttress detail. The 2b structures are identical to 2a elements, except for the addition of a metal panel in the Roller gate track section of the gate piers that does not occur in 2a structures. Only 1b and 2a architectural types occur in the St. Paul District. Other elements, such as central control stations, lockkeepers' residences, and associated structures are standardized, unless otherwise noted.

Dates for the construction of each complex are given from the beginning of initial work to the end of the project and do not necessarily reflect the construction dates of any single element. Complete construction histories for each complex containing exhaustive documentation for the building of the lock, dam, esplanade features, and other attendant installations are on file with the St. Paul District Office. These histories contain comprehensive listings for all general contractors and subcontractors involved in the project as well as a listing for all material suppliers. For the purposes of this study, information regarding contractors and subcontractors has been reproduced as it appears in the construction histories. As a result, certain inconsistencies appear as a matter of course. For example, in some histories, the contractor's business location is cited by city; in others, this information is not included. In addition, approximately 10,000 separate construction drawings and illustrations were produced during the project and during the course of maintenance since its completion. Drawings were selected from among these materials to illustrate both standardized elements as well as those pertaining to specific sites. General index sheets have also been reproduced at the beginning of each lock and dam illustration collection for a complete reference. Contemporary photographic documentation, including 16mm film footage, served to document the project. Photographs are on file in the St. Paul District Office and at each individual installation. Sixteen millimeter film footage is available in video cassette format from the St. Paul Office.

Dimensions for the movable gate sections are given in approximate figures, based on the general notations as found in official Corps publications. For example, Roller gates are generally cited as being standardized as either 60 by 20 feet or 80 by 20 feet. However, in the construction history notations, gate lengths are often given exactly as 88 feet 10-1/2 inches long and 15 feet in diameter. Similar approximations apply to information concerning Tainter gate elements. Measurements in both instances should be taken only as approximations, for use in categorizing the various sizes and styles of installations and not as an exact measure per se.